July 31, 2002

D.T.E 02-38

Investigation by the Department of Telecommunications and Energy on its own Motion into Distributed Generation.

OPENING COMMENTS OF CAPSTONE TURBINE CORPORATION

INTRODUCTION

Capstone Turbine Corporation is pleased to be able to offer opening comments in support of this important Motion to address the major issues confronting Distributed Generation in the State of Massachusetts.

Capstone is a manufacturer and distributor of 30kW and 60kW microturbine system and will commence manufacturing a new 200kW system next year. Capstone microturbine systems are compact low emissions integrated turbine based power generators. Inverter technology is integrated into each microturbine system and, through these inverters, the microturbine may be connected safely to the utility grid.

Capstone microturbines are used in three distinct ways that typify the use of distributed generation. Many microturbines are deployed in combined heat and power mode whereby heat, which is a byproduct of the power production process, is captured and used to displace consumption of other fuels for heat purposes. MicroCHP systems of this type achieve overall efficiencies of 85%, which is a substantial improvement over the electrical efficiency of the average U.S. thermal power plant (33%).

Capstone's microturbines are also operated on renewable fuels including landfill gas and digester gas such as those produced by wastewater treatment facilities and by agricultural waste. In these applications, distributed generation provide the benefit of converting otherwise wasted and polluting emissions into a useable energy source that displaces the need to consume other fossil fuels.

The third way that Capstone microturbine systems are used in distributed generation is for power quality and reliability. Several utilities use microturbines at substations as a means of providing voltage support and as a way of deferring upgrades. In addition, microturbines are used in UPS systems to provide customers with enhanced reliability.

Capstone has been involved in the development of the distributed generation industry since the early 1990s and has participated in the development of statewide interconnection standards in New York, Texas and California as well as contributing to the IEEE process for the development of interconnection standards. Capstone has also participated in standby rate proceedings and legislative actions in New York and California.

INTERCONNECTION

The interconnection requirements of Massachusetts's utilities do act as a barrier to the deployment of distributed generation because they are neither uniform nor systematic.

While manufacturers of central power plants achieve lower costs through economies of size, manufacturers of distributed generation seek cost reduction through economies of scale. Mass production of distributed generation technologies leaves little room for customization of the product. As a result, manufacturers of distributed generation

technologies look for interconnection standard that prescribe all parameters that have to be met and that leave little open to site specific or subjective evaluation.

a) Steps to address the interconnection barriers

A manufacturers perspective of interconnection leads to the following recommendations for any interconnection standard.

Establish a simplified statewide uniform interconnection standard that is consistent with standards in other states.

This will enable manufacturers of distributed generation technology to build products efficiently that are safe for interconnection within and between states. We recommend the Department adopt the California State standard as this standard has been developed through a lengthy series of workshops involving DG manufacturers and installers and the utilities. The California standard was developed after the New York and Texas state standards and it represents an advancement of those standards. Adoption of the California standard would assist the deployment of DG in Massachusetts.

Define performance requirements, not technology requirements.

The New York, Texas and California state standards each define protective functionality and settings but do not prescribe relays or any other technology. By specifying protective functionality, the manufacturer has a clearly defined specification for manufacturing a suitable product. The manufacturer or installer of

the technology is then required to demonstrate that its solution will meet the protective functionality defined in the standards.

Provide for type testing and certification of technology and enable all certified technology to be interconnected without further review.

Type testing of the interconnection devise enables the manufacturer to verify efficiently that its interconnection device meets the standards. All interconnection devices that are type tested and certified to meet the standard should then be eligible for interconnection without additional review or study.

Interconnection fees should be predetermined.

The installer of DG needs to have certainty about the cost of interconnection. To ensure this certainty a fee should be prescribed for each type of interconnection.

Size should not determine interconnection requirements

All DG systems should be subject to the same interconnection requirements irrespective of the size of the DG system.

Simplify and systematize the application process

The application process should define the circumstances whereby utility system studies are required and the circumstances whereby these studies are not required. It is important fro the installer and the manufacturer that the requirements be explicit

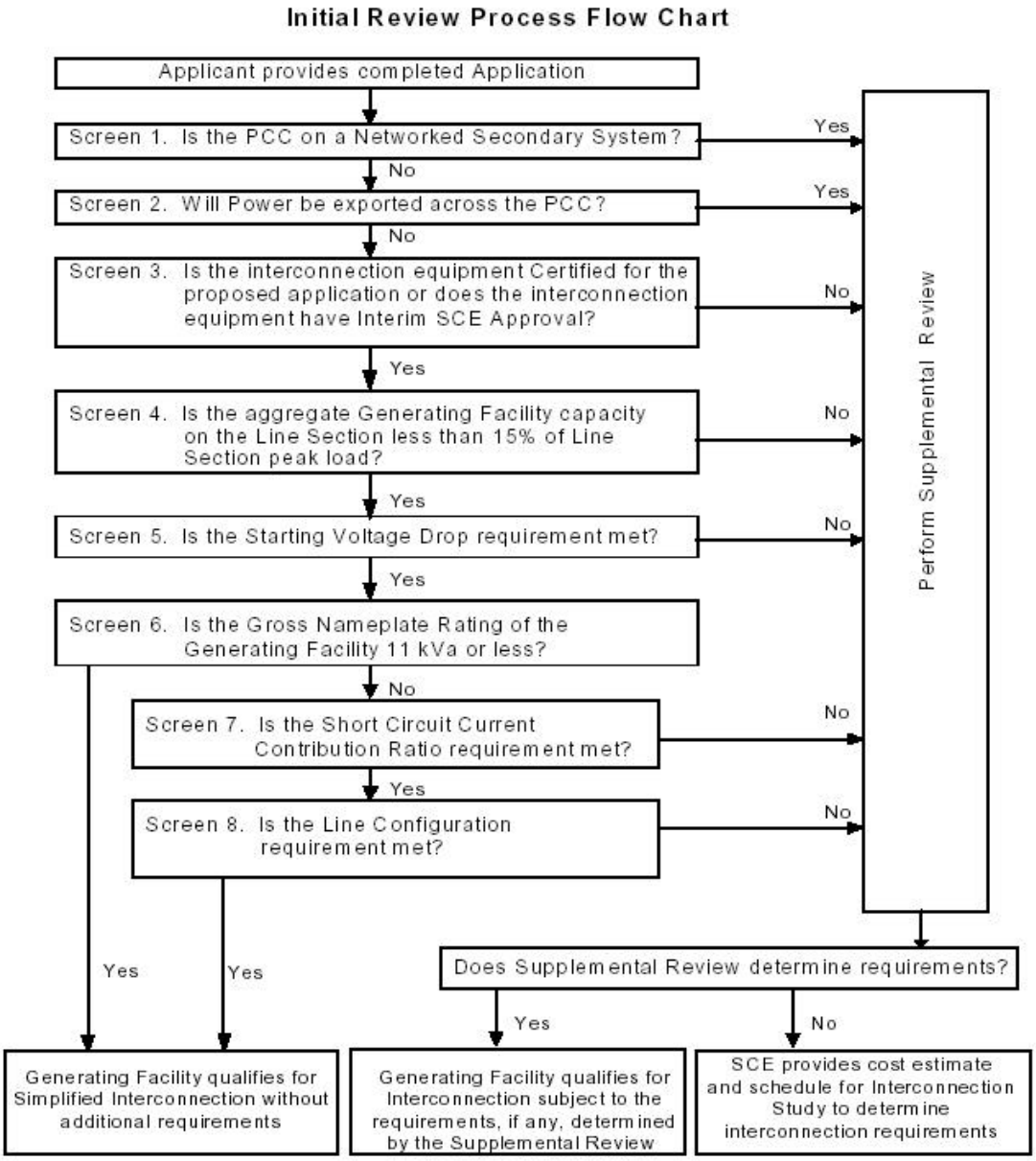
and objective. This will enable both installer and manufacturer to design product and projects that minimize cost to the customer and the utility.

The California standard provides a far and reasonable process that defines the circumstances whereby a project can be installed without the need for utility studies. This interconnection rule has enabled the efficient installation of small DG systems in California. An illustrative flow chart of the California Application process is provided in Figure 1 below. This chart is taken from Southern California Edison's interconnection Rule (see http://www.sce.com/NR/sc3/tm2/pdf/Rule21.pdf) but is consistent with the state standard for California.

b) Should Massachusetts adopt the IEEE standard?

No. The IEEE standard is incomplete. It is also too complex and likely will become more complex as it is further developed. And it fails to prescribe interconnection costs. Massachusetts would be better served by adopting the California standard, which is not only complete but has also been tested in the field with numerous safe installations of DG to California's grids.

Figure 1. Interconnection Application Process



STANDBY AND BACKUP RATES

Capstone believes that customers who install distributed generation should remain on the otherwise applicable rate and that no additional rate or charges should be applied. This position follows from our view that distributed generation is equivalent to demand side load management or conservation from the perspective of the grid. For example, the utility will see the same effect from a customer that chooses not to use its air conditioning system during the summer peak as it will see from a customer that uses distributed generation. It is reasonable to treat these 2 customers equivalently with respect to rates. As a result of this reality, the imposition of standby rates is inappropriate. Such rates imply that the use of distributed generation imposes a different cost structure on the utility than is imposed by conservation or demand response programs whereas no such difference exists.

a) How should standby rates be designed

To the extent that a separate rate is developed for Distributed Generation customers, then those rates should be designed to recover utility costs on an as-used basis rather than a monthly contract demand charges. That is, the DG customer should be required to pay only when they use the utility system and should not be required to pay a month contract or reservation charge. There is no logical case and few real world examples to suggest that the cost of a shared facility (a utility distribution system is largely a shared facility) should be recovered by way of a fixed contract charge. Moreover, if customers have to pay for a service whether they use those services or not, they will be inclined to install

and operate the cheapest and least reliable distributed generation systems, thereby imposing on the utility a need for more facilities that would otherwise be appropriate.

Only the cost of dedicated facilities could justifiably be recovered by way of a contract demand charge or a customer charge.

No state, to our knowledge, has developed standby rates that are appropriate for adoption by Massachusetts. However, the state of California has passed a law (SB28X) that exempts certain types of DG from standby charges. This law also recognizes that DG is equivalent to demand side management and instructs the California Public Utilities Commission (CPUC) to develop methods for incorporating this equivalence into its standby rate design. The CPUC has yet to implement this legislative requirement.

DISTRIBUTION COMPANY INVOLVEMENT IN DISTRIBUTED GENERATION

Capstone believes that utilities should have the right to own and deploy distributed generation on both sides of the meter. Allowing utilities to own DG does not impact the wholesale electricity market but does enable more rapid deployment of DG and thereby allow for the benefits of DG to be realized faster than otherwise.

a) Providing reliable least cost power

Several U.S. utilities are already using microturbines in their substations to provide voltage support and to defer capacity upgrades. In these applications, the utility's distribution system is directly served by the installation of distributed generation. And the customers of the distribution system gain improved power quality and reliability. Utilities in the Massachusetts should also have the right to own and operate distributed generation to support their distribution systems and thereby deliver improved power quality and reliability where applicable. As part of the system planning process, utilities should be expected to, or required to, consider the use of DG technologies among the alternatives for meeting their customers' needs for reliable power at least cost. They should have the freedom to own DG technologies for use on the grid side of the meter or to contract services to a third party.

UTILITY OWNERSHIP OF DG AT CUSTOMER SITES

Distributed Generation is delivered power and, as such, is a substitute for transmission and distribution facilities. This makes DG very different from Generation, which does not have transmission, and distribution embedded in it but depends on separate transmission and distribution for delivery.

Because utilities are the most successful providers of electricity they have the greatest ability to deploy Distributed Generation and thereby make the benefits of DG available to energy users. Capstone believes utilities should have access to all available means of

meeting their customers' needs. Utilities should have the right to own and deploy distributed generation on the customer side of the meter if such deployment better meets a customer's needs. For example, an on-site Combined Heat and Power system rather than grid power and a separate boiler providing heating needs may better serve a customer that has a need for heat and power. Similarly, customers who prefer renewable power may be served better with on-site power such as photovoltaic or biogas. Capstone believes that competition in the electricity industry is better served by allowing the utility to compete with other providers to deliver these on-site services.

Moreover, the limited evidence available suggests that preventing utility ownership of DG on the customer side of the meter encourages the utility to impose barriers to the deployment of DG while allowing utility ownership increases the deployment of DG. In California the Investor Owned Utilities (IOUs) are not permitted to own DG but the Municipal utilities may own DG. The experience is that Municipals such and Los Angeles Department of Water and Power (LADWP) have been effective in deploying new DG facilities[1] while the IOUs have often been seen as imposing barriers (in the form of interconnection requirements, standby charges and exit fees for example).

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[1] For example, LADWP has deployed microturbines to produce power from landfill gas. Without the utility involvement in this project the landfill gas would continue to be flared, providing no public value.